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Ensuring Spectrum-Dependent Systems are "Up to Code" Saving Time, Money

By Thomas Kidd and Mark Rossow - [January-March 2012](#)

To achieve the most efficient use of communications-electronics (C-E) resources, the required capabilities of systems and equipment should be met during the procurement phase — rather than investing in equipment that may require redesign or retrofitting after development. Therefore, it is more critical than ever in these budget constrained times that program offices and procuring officials take advantage of processes that ensure systems and equipment provide their intended capabilities with minimal rework.

The use of electromagnetic spectrum, or radio frequencies, is a common wireless enabler for many, if not most, new C-E systems. The proliferation of wireless spectrum use within the Department of the Navy continues to increase. As a result, access to electromagnetic spectrum for all wireless systems is no longer ensured.

The electromagnetic spectrum is a scarce and highly regulated resource used around the world. Ensuring spectrum support for DON systems is a critical and necessary requirement that must be initiated during procurement and in the earliest stages of system development. Systems must be designed to operate in the proper spectrum, or they may interfere with other systems or violate international treaties and regulations. Retrofitting systems to bring them into compliance with regulations is often much more expensive than properly designing them from the beginning.

Spectrum supportability — meaning the availability of radio frequencies for a given system in its intended operating environment — must be ensured for C-E equipment that use radio frequencies. The term also describes whether a system's spectrum use is in compliance with local regulations and international treaties. While the term is regularly used within the Department of Defense's spectrum community, it is critical that it is understood throughout the DON's operational and acquisition communities, which procure and develop spectrum-dependent systems and equipment.

Spectrum supportability entails a number of factors that include the location in which the equipment will be operating and its compatibility with other equipment, as well as safety factors. The process to ensure a high degree of spectrum supportability begins early in the acquisition process. Organizations must complete and submit a spectrum supportability risk assessment and an application for equipment frequency allocation. This ensures compliance with international, federal, DoD and DON spectrum policy.

The information provided in the assessment and application is used by personnel within the federal government, departments of Defense and Navy, and host nations (nations that allow the United States access to their spectrum) to provide guidance for the successful acquisition of spectrum-dependent equipment and to ensure radio frequencies can be made available within the equipment's intended operational area. The completion and data requirements of the assessment and application are detailed in DoD Instruction 4650.01: "Policy and Procedures for Management and Use of the Electromagnetic Spectrum."

These documents are similar to building permits. While building permits assess zoning, water, sewage and other factors that encompass building construction, the spectrum supportability documents are reviewed to determine potential effects on the electromagnetic environment, as well as compliance with applicable regulations, treaties and guidance. These evaluations are intended to ensure that radio frequencies can be acquired in the equipment's intended operational area and that the use of the equipment will not degrade the effectiveness of other spectrum-dependent equipment in the same environment.

Additionally, consideration must be given to a system's electromagnetic environmental effects (E3). E3 considerations include radio frequency interference and potential detrimental effects from its use on other electronics systems (RF dependent or not). Electromagnetic environmental effects can degrade the performance and operational capabilities of guidance systems, weapons systems and munitions. In some cases, environmental effects have the potential to cause catastrophic events.

An equally critical aspect of spectrum supportability is the DON's requirement to be fiscally prudent with acquisition funds. The development or acquisition of spectrum-dependent systems that are not



PACIFIC OCEAN (June 8, 2011) Aviation Electronics Technician 3rd Class Christopher Jiles, from Lemoore, Calif., reads schematics before troubleshooting the weapons systems on an F/A-18F Super Hornet from the Black Aces of Strike Fighter Squadron (VFA) 41 in the hangar bay aboard the aircraft carrier USS John C. Stennis (CVN 74). John C. Stennis is participating in a joint task force exercise off the coast of Southern California. U.S. Navy Photo by Mass Communication Specialist 3rd Class Timothy Aguirre.



NORFOLK (Sept. 9, 2011) The Virginia-class attack submarine Pre-Commissioning Unit (PCU) California (SSN 781) gets underway from Naval Station Norfolk to conduct weapons systems acceptance trials. California is the eighth Virginia-class submarine and is scheduled to be commissioned Oct. 29. U.S. Navy photo by Mass Communication Specialist 2nd Class Danna M. Morris.

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supportable wastes precious resources.

It is more than fiscally wasteful; it can result in the loss of necessary, and sometimes vital capabilities for the operational forces, which can heighten the risk of mission failure and injury. The need for efficient and effective use of funds cannot be overstated. The Office of Management and Budget requires agencies to ensure radio frequencies can be made available before estimates are submitted for the development or procurement of spectrum-dependent systems.

Just like building permits are updated to allow modifications, so too must spectrum supportability documents be regularly updated to remain current with acquisition and development changes. Updating spectrum data enables spectrum professionals to continually provide refined guidance to further ensure a system's spectrum supportability.

Completing and updating spectrum supportability documents provide acquisition professionals a level of assurance that the required radio frequencies will be available for the operation of the equipment. This, in turn, provides a similar level of assurance that funds will be spent on capabilities that can be employed by Sailors and Marines and will not be wasted on rework.

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